Filter curtain materials, entrainment, biofouling and permeability.

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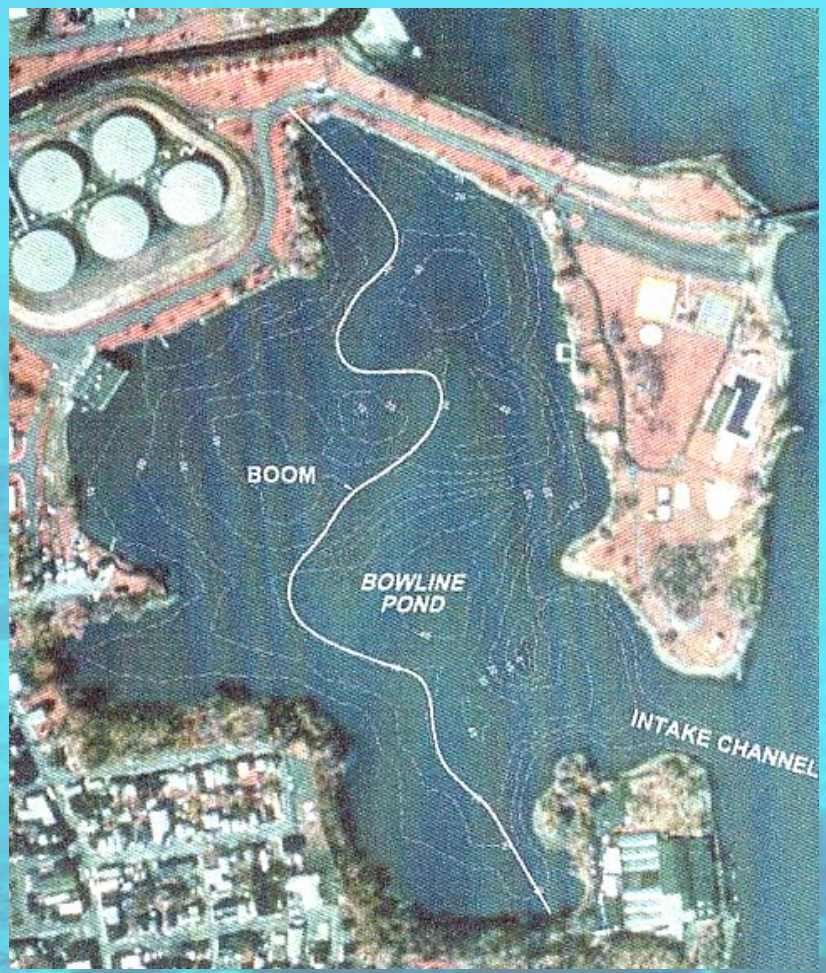
Filter curtains and entrainment



- At Lovett, on the Hudson, a Gunderboom filter curtain has been tested experimentally in an attempt to reduce entrainment.
- Further installations are intended including at Bowline.

Fouling is universal

- Any object in water will tend to be colonised by a range of organisms.

- Filter fabrics are unlikely to be an exception.

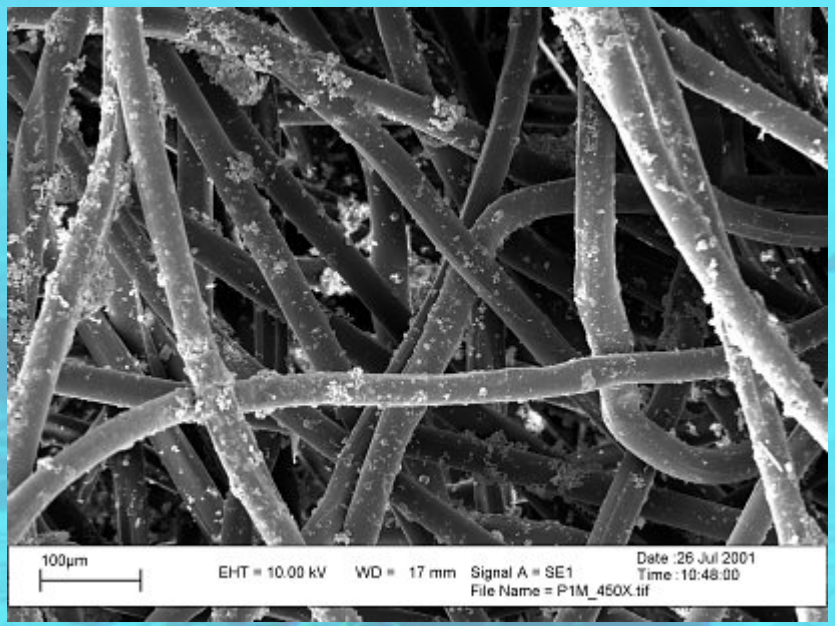
Bowline pond

- A large Gunderboom filter curtain has been suggested for Bowline Pond on the Hudson River.
- Biofouling was thought to be a significant problem.
- An experiment was performed to investigate the rate and extent of biofouling.

An experiment to investigate biofouling

- A series of pieces of gunderboom were exposed in Bowline Pond in June 2001.
- They were examined at regular intervals.
- Observations of the level of biofouling were made.

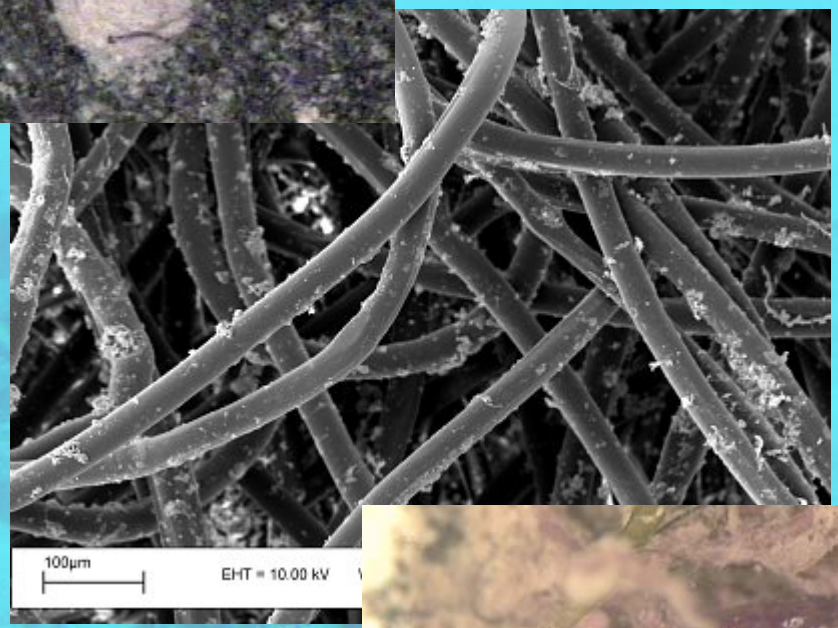
After 11 Days



- Little fouling had occurred.
- Some macro-crustaceans had colonised the fabric.

The fabric at 11 days

After 20 Days

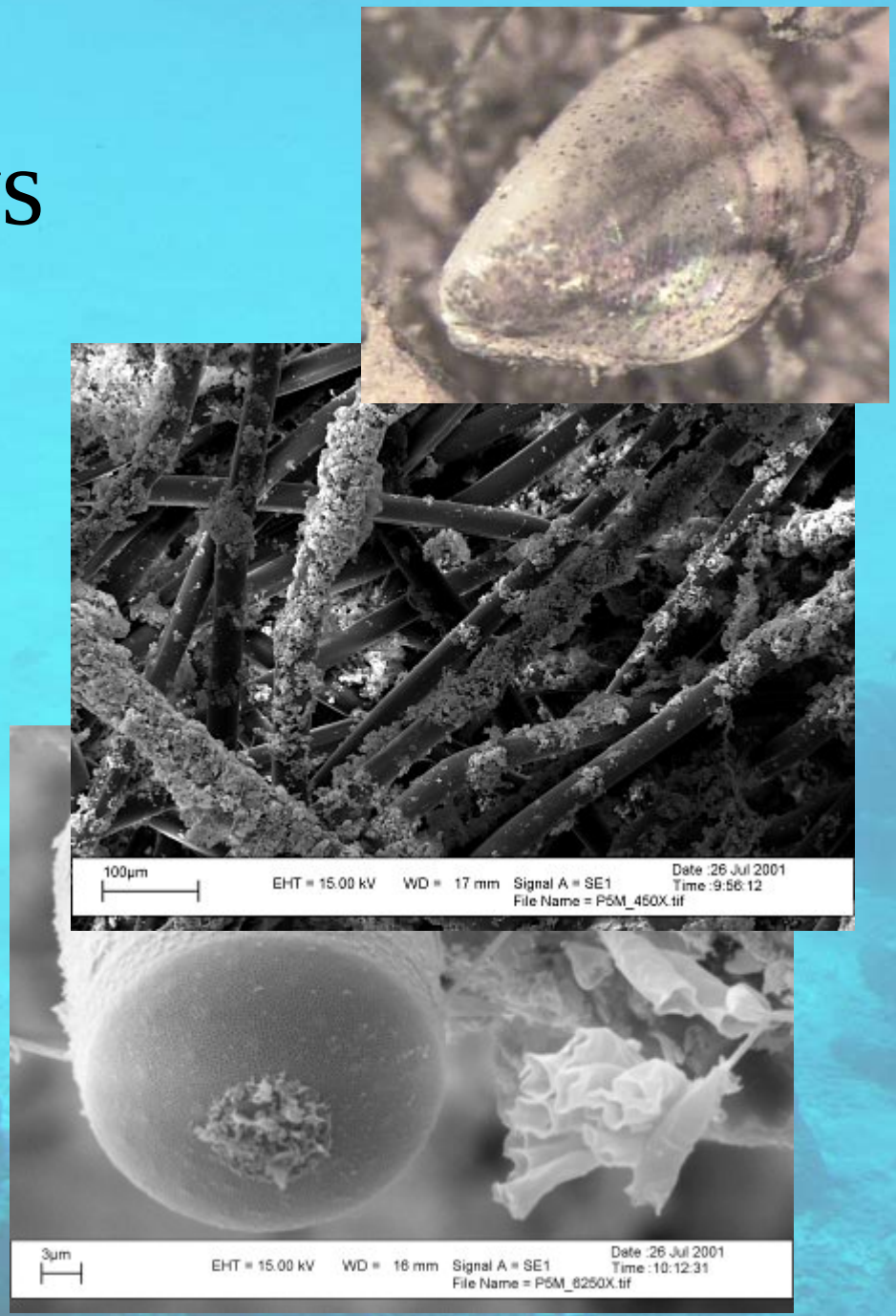


- Fouling was evident on the fibres.
- Many of the holes in the fabric had *Corophium* living in them.
- Other biofouling organisms were present.

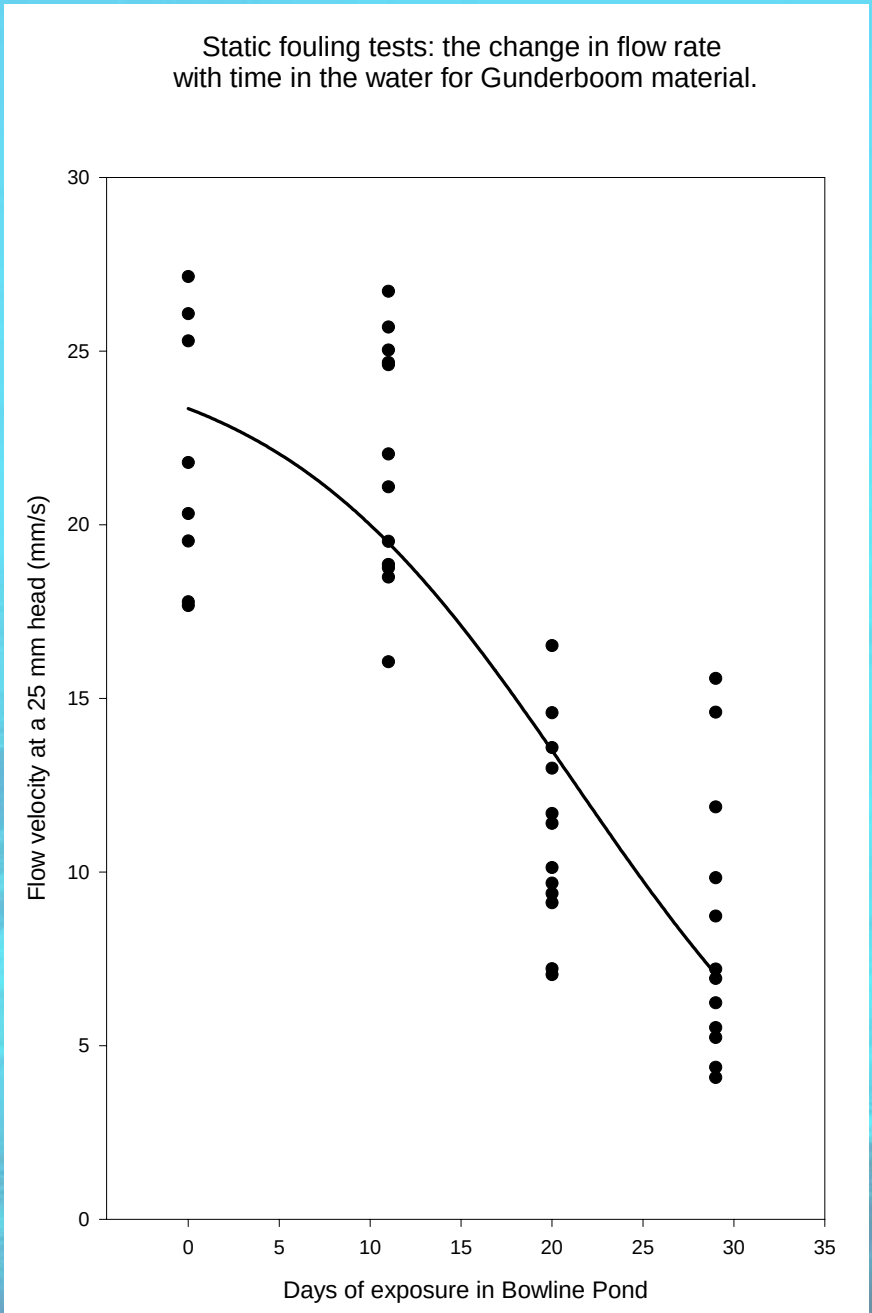
The fabric at 20 days

After 30 Days

- Fouling continued.
- The community became ever more diverse.
- Burrowing animals were clearly loosening the surface.



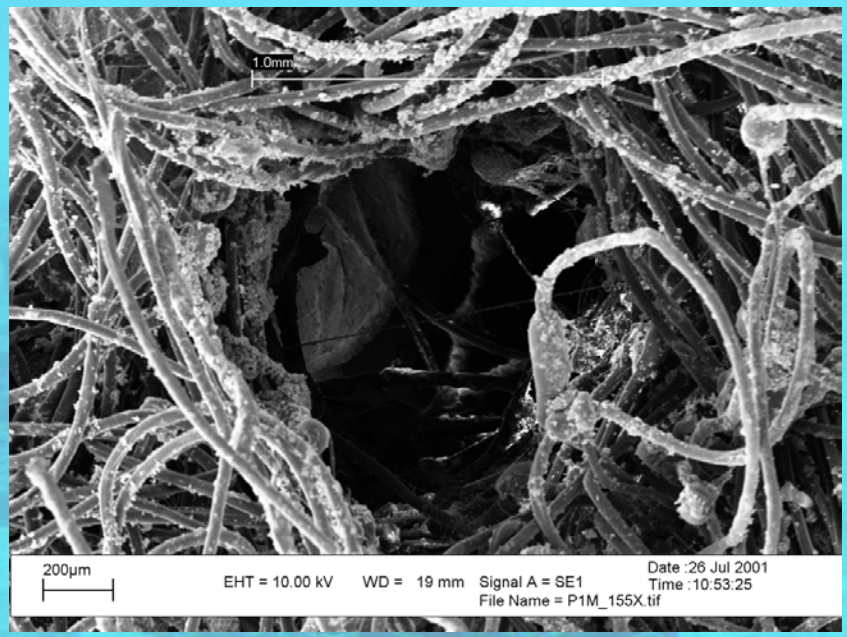
The fabric at 30 days

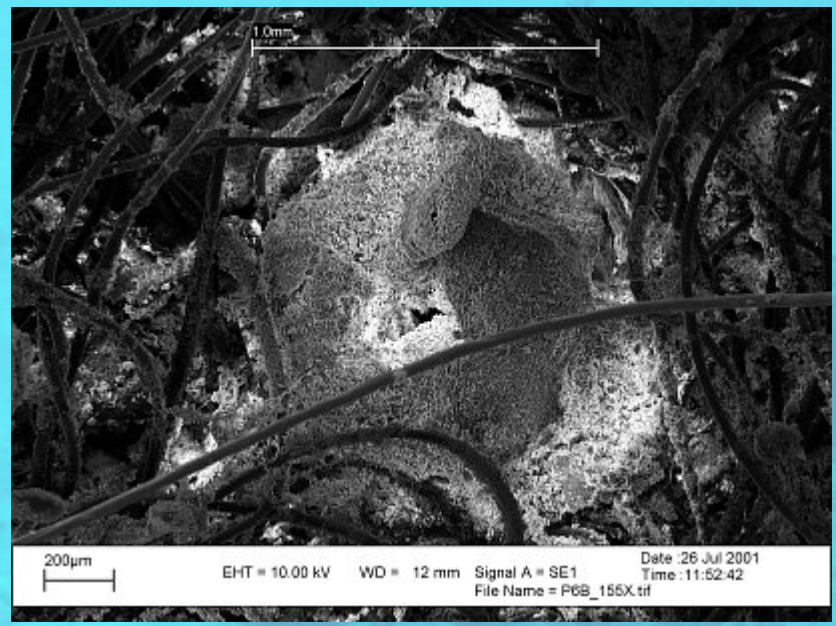


Changes in permeability

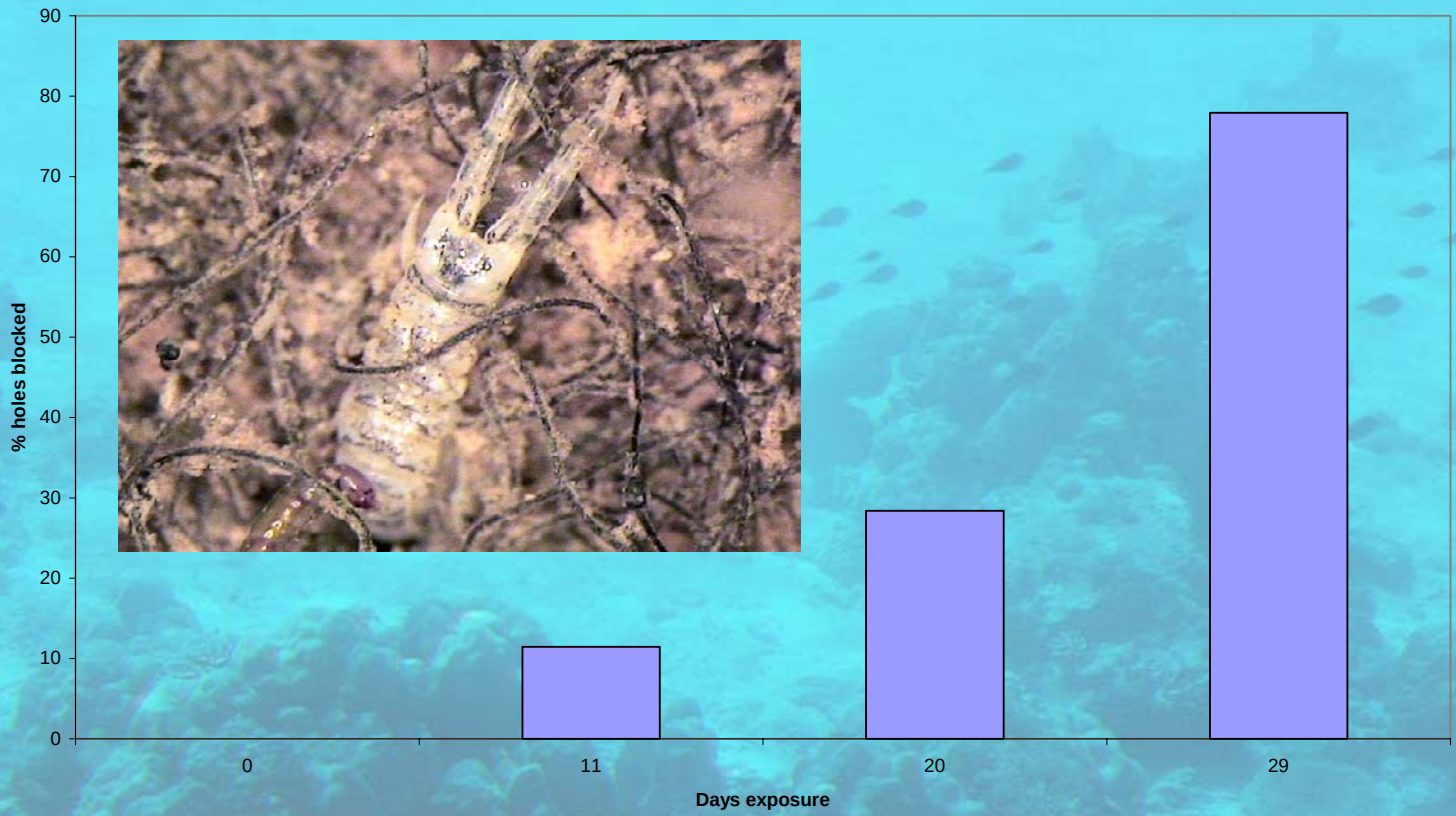
At regular intervals the permeability of the fabric was measured

Tube building in pores

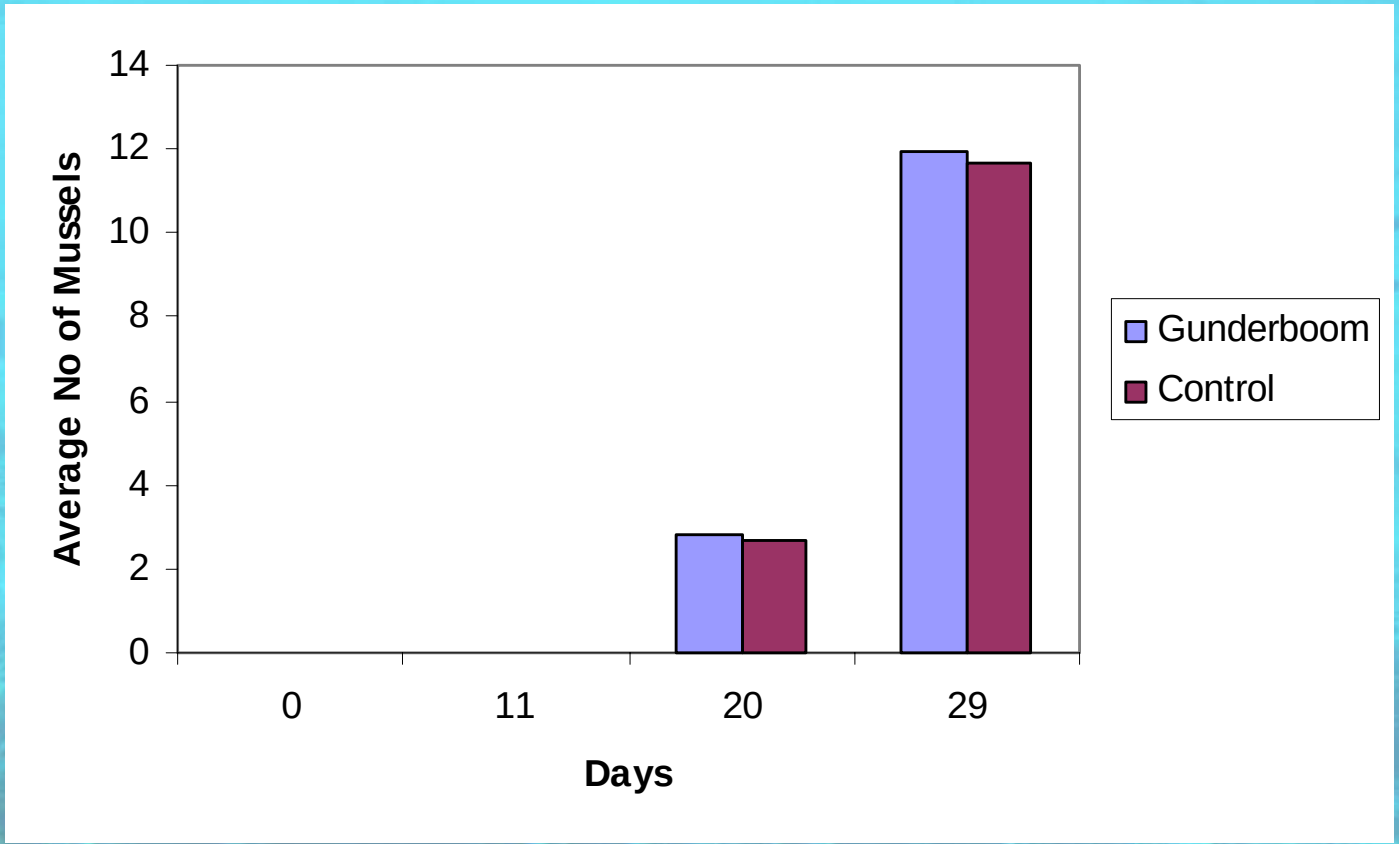




Increased colonisation of pores



Zebra mussel fouling

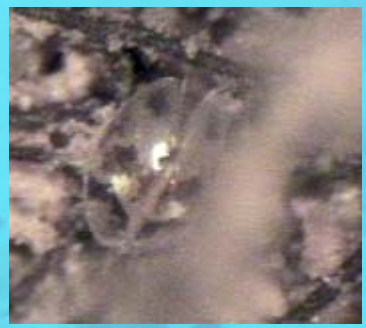


Fouling with flow and air burst

- The results reported so far have been with static panels.
- Tests on a panel through which water was drawn and air burst cleaning was applied showed even worse fouling.
- Fouling resulted in only 3.9% of the flow of clean filter at 25 mm head.

Colonisation by fish predators

- Larval fish drawn onto the fabric are vulnerable to predation.
- Several predators were observed on the fouled fabric including ostracods, amphipods, crabs and young catfish.



Conclusions

- Problems with biofouling during the experimental deployment at Lovett have not been reported.
- However, we would anticipate that fouling would be a potentially serious problem in estuarine and marine waters.
- Our brief experiments demonstrated that filter material can be rapidly colonised and the permeability greatly reduced. Therefore care should be taken when assuming that the Lovett experience will be the case at other sites.
- Zebra mussels were colonising after 20 days – this may be a major problem in some freshwater and low salinity sites.
- The surface was colonised by predators such as small crustaceans that may feed upon fish larvae and eggs.